

Summary

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Methodological News contains articles on a range of topics from across different areas within the Methodology Division in the ABS. This issue there is an article on a literature review about developing clear and effective instructions on how to access online forms and an article on research undertaken into weighting and imputation methods for dealing with missing data.

Developing Instructions on how to Access Online Surveys: Layout and Content Design Principles

DEVELOPING INSTRUCTIONS ON HOW TO ACCESS ONLINE SURVEYS: LAYOUT AND CONTENT DESIGN PRINCIPLES

The ABS has committed to convert more of its surveys to user-friendly online forms. Online forms are promising as a cost and time efficient alternative to non-digital collection methods. To make the online form option simple and easy to complete (cognitively simple and motivating), Respondent and Collection Methodology conducted a literature review about developing clear and effective instructions on how to access online forms. This article summarises the design principles for the layout, content, and cognitive aids for online survey instructions that can be used to maximise online form uptake.

Layout

Organisation: The organisation of information in instructions affects respondents' ability to efficiently and successfully locate, categorise and extract information (Ganier, 2004). To accommodate the needs of all types of respondents, information should be accessible at two different levels. At the first level, information should be organised in a chronological linear format (e.g. starting with basic functions then progressively introducing more advanced functions) to accommodate for beginners and cautious respondents. At the second level, information should also be organised in a non-linear modular format (e.g. using colour-coded headings to enable quick location) to accommodate for experienced and trial-and-error respondents. Although design principles for both levels should be applied, more emphasis can be placed on one of the levels depending on the task complexity and type of respondents.

Text: Ease the reading and recall process for respondents by dividing instructions into segments (e.g. steps), numbering each segment, and presenting them in a vertical sequence (Frase, 1981; Mills et al, 1993).

Headings: Clear, precise and prominent headings should be used to allow respondents to activate schemas and elaborate on a conceptual model of what they are trying to achieve so that they can set goals, and monitor and regulate their activity (Dixon, 1987a, 1987b; Wright, 1977). Headings should be placed sufficiently early before the instructions to enhance learning; correspond to goals or sub-goals to enhance learning; and be a different size and colour font from the body of the text to make them more spatially prominent.

Content

Words, word order and sentence structure: Familiar words should be used to make it easier for respondents to read, comprehend and draw inferences (Wright & Barnard, 1975). The order of words and actions should match the order in which they have to be performed (a temporal word order sequence). These principles should be used to develop short, active, affirmative sentences to place minimal cognitive load on respondents.

Level of Detail: The level of detail in instructions affects initial performance, learning, and the transfer of information (Eiriksdottir & Catrambone, 2011). Instructions for one-off tasks should be detailed and highly resemble the task to enhance initial performance. On the other hand, instructions for recurring tasks should be brief and abstract to enhance learning.

Cognitive Aids

Signals: Topic headings, typographic cues (e.g. font, type size, italics, bold, colour, underlined), white space (e.g. indents, bullets), grouping by proximity or colour, and attention-directing graphic elements (e.g. arrows, icons, shading, animation) should be used to make important elements more prominent and easier to cognitively organise (Mautone & Mayer, 2001).

Advance organisers: A brief analogy or diagram of the key variables or message can be presented before the instructions to prime respondents to organise the text into a congruent mental model (Mayer, 2008).

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Further Information

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Weighting and Imputation for Missing Data

WEIGHTING AND IMPUTATION FOR MISSING DATA

In readiness for the current transformation program happening at the ABS, research was undertaken into the set of weighting and imputation methods available for dealing with missing data.

A major focus of the research was looking at two-phase calibration estimators for treating non-response. A wide variety of such estimators were tested on simulated household and business surveys. The project recommended that the first choice weighting method for the treatment of missing data is the response propensity calibration estimator, as it was the simplest estimator among those with the best performance. In this estimator a model is formed to estimate the response probability of each responding unit then the initial weight of each responding unit is multiplied by the inverse of its response probability.

An issue with this estimator is that if the estimated response propensity is very small, the resulting weight can be very large which can result in some responses having very large influence on the final estimates. The research presented a modified boxplot method that appears to provide a suitable treatment for trimming extreme estimated response probability weight adjustments.

A review of the current imputation methods used in ABS business surveys recommended that some rationalisation of the large number of imputation methods available to ABS business surveys should be undertaken. Looking at the deterministic imputation methods available in ABS business surveys, the current 39 imputation methods available for ABS business surveys could be replaced by the more general Deterministic Regression Imputation Method, the Deterministic Nearest Neighbour Donor Imputation Method and a Zero Imputation Method (i.e. method to set missing values to 0).

Some surveys don't ask all questions of all units, e.g. smaller businesses may not be asked some questions due to it being unlikely they have the required information readily available. This is referred to as item missingness which is missing by design. Imputation for these missing values adds a non-negligible amount to totals, so as the imputation

methods contain variability, this variability needs to be estimated to give a good final estimate of variance. It was found that the imputation should therefore be done using multiple stochastic imputation methods, although there may be some situations where the missing data could be treated using weight adjustment (i.e. the units with missing data be dropped entirely and the other units be weighted to compensate). Weight adjustment significantly reduces the number of replicate weights that need to be computed and stored, however it does not produce good estimates for domains that are not benchmarked to (e.g. if benchmarks are at Australia by industry level, the state estimates will be poor) or for variables that were reported on for the dropped units (i.e. where useful responses were deleted when the units were dropped).

A research and evaluation study was undertaken into appropriate imputation methods for imputation of categorical data items in ABS household surveys. It found that CHAID (Chi-squared Automatic Interaction Detection) could be used to quickly and automatically identify useful groups for hot-deck imputation. In the simulation study the CHAID selected groups identified using the particular study variable always produced the highest percentage of correct imputations, and often produced the smallest relative root mean square errors. In almost of the all situations, using CHAID selected groups performed better than using the manual selected groups.

Further Information

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Methodological News features articles and developments in relation to methodology work done within the ABS Methodology Division. By its nature, the work of the Division brings it into contact with virtually every other area of the ABS. Because of this, the newsletter is a way of letting all areas of the ABS know of some of the issues we are working on and help information flow. We hope the Methodological Newsletter is useful and we welcome comments.

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About this Release

The Methodological News is a quarterly information bulletin from the Methodology and Data Management Division. The newsletter features articles and developments in relation to work done with the division.